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(54) COMPONENT PUBLISHING METHOD, COMPONENT BUILDING METHOD BASED ON GRAPHICAL MACHINE LEARNING ALGORITHM PLATFORM, AND GRAPHICAL MACHINE LEARNING ALGORITHM PLATFORM

(57) A component release method, a graphic machine learning algorithm platform-based component building method, and a graphic machine learning algorithm platform are provided. The graphic machine learning algorithm platform can release or build a functional model as a new component. Therefore, when a user needs to use a certain function repeatedly, the new component can be directly used without the need of repeatedly building a functional model, thus facilitating use by the user.

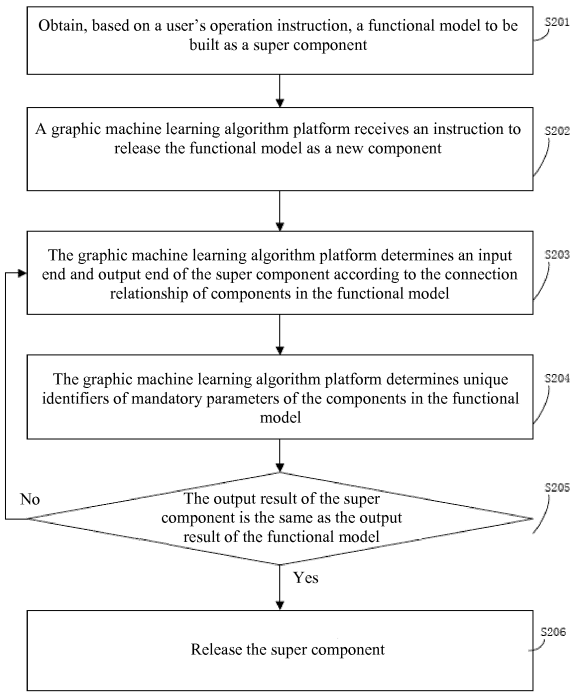

FIG. 2

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Description

[0001] This application claims the priority of Chinese Patent Application No. 201710011143.6, filed on January 6, 2017 and entitled "COMPONENT RELEASE METHOD, GRAPHIC MACHINE LEARNING ALGORITHM PLATFORM-BASED COMPONENT BUILDING METHOD, AND GRAPHIC MACHINE LEARNING ALGORITHM PLATFORM", which is incorporated herein by reference in its entirety.

Technical Field

[0002] This application relates to the field of electronic information, and in particular, to a component release method, a graphic machine learning algorithm platform-based component building method, and a graphic machine learning algorithm platform.

Background

[0003] A graphic machine learning algorithm platform is a user interaction platform and can provide a modeling function to users. Components are basic units of the graphic machine learning algorithm platform. A user organizes components into an ordered process to establish a model having a certain function. For example, FIG. 1 shows a model established by a user and having a function of analyzing user churn data, wherein an elliptical icon represents a component, and the name of the elliptical icon, such as "splitting-1" and "random forest", represents the algorithm run by the component. The user can establish a model for analyzing user churn data by connecting these components into an ordered process using arrows.

[0004] However, if the user needs to use the function again, he/she further needs to re-establish the functional model.

Summary of the Invention

[0005] During research, the applicant found that if an established functional model can be released or built as a new component in a graphic machine learning algorithm platform, then when the function is needed again, the new component can be directly selected without the need of establishing the functional model repeatedly.

[0006] A component release method, a graphic machine learning algorithm platform-based component building method, and a graphic machine learning algorithm platform are provided in this application, and they aim to solve the problem of how to release or build a new component in a graphic machine learning algorithm platform.

[0007] In order to achieve the above objective, this application provides the following technical solutions.

[0008] A component release method, comprising:

after receiving an instruction to release a functional model as a new component, determining an input end and output end of the new component according to the connection relationship of components in the functional model;

determining unique identifiers of mandatory parameters of the components in the functional model, wherein the unique identifiers are used for the new component to identify values of the mandatory parameters during running; and

releasing the functional model as the new component.

[0009] Optionally, determining unique identifiers of mandatory parameters of the components in the functional model includes:

after receiving an instruction to select a component in the functional model, displaying a visual interface of the component; and

receiving a unique identifier of a mandatory parameter of the component through the visual interface.

[0010] Optionally, the visual interface includes:

a configuration interface of a mandatory parameter configuration control of the component, wherein the mandatory parameter configuration control is used for receiving a configuration instruction for the mandatory parameter during the running of the new component.

[0011] Optionally, the visual interface further includes:

a configuration interface of an optional parameter configuration control, wherein the optional parameter configuration control is used for receiving a configuration instruction for the optional parameter during the running of the new component.

[0012] Optionally, releasing the functional model as the new component includes:

inputting test data to the new component and running the new component;

inputting the test data to the functional model and running the functional model; and

if data output by the new component after running is the same as data output by the functional model after running, then releasing the functional model as the new component.

[0013] A graphic machine learning platform-based component creation method, comprising:

after receiving a new component creation instruction, a graphic machine learning platform creating a new component according to an established functional model, wherein a mandatory parameter of each component in the new component has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running.

[0014] Optionally, creating a new component according to an established functional model includes:

determining unique identifiers of mandatory parameters of components in the functional model, and determining an input end and output end of the new component according to the connection relationship of the components in the functional model, so as to create the new component.

[0015] A graphic machine learning algorithm platform, comprising:

an input and output determination module for determining, after receiving an instruction to release a functional model as a new component, an input end and output end of the new component according to the connection relationship of components in the functional model;

an identifier determination module for determining unique identifiers of mandatory parameters of the components in the functional model, wherein the unique identifiers are used for the new component to identify values of the mandatory parameters during running; and

a release module for releasing the functional model as the new component.

[0016] Optionally, the identifier determination module being used for determining unique identifiers of mandatory parameters of the components in the functional model includes:

the identifier determination module being specifically used for displaying, after receiving an instruction to select a component in the functional model, a visual interface of the component; and receiving the unique identifier of the mandatory parameter of the component through the visual interface.

[0017] Optionally, the identifier determination module being used for displaying a visual interface of the component includes:

the identifier determination module being specifically used for displaying a configuration interface of a mandatory parameter configuration control of the component, wherein the mandatory parameter configuration control is used for receiving a configuration instruction for the mandatory parameter during the running of the new component.

[0018] Optionally, the visual interface further includes:

a configuration interface of an optional parameter configuration control, wherein the optional parameter configuration control is used for receiving a configuration instruction for the optional parameter during the running of the new component.

[0019] Optionally, the release module being used for releasing the functional model as the new component includes:

the release module being specifically used for inputting test data to the new component and running the new component, inputting the test data to the functional model and run the functional model, and if data output by the new component after running is the same as data output by the functional model after running, then releasing the functional model as the new component.

[0020] A graphic machine learning algorithm platform, comprising:

a component creation module for creating, after receiving a new component creation instruction, a new component according to an established functional model, wherein a mandatory parameter of each component in the new component has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running.

[0021] Optionally, the component creation module being used for creating a new component according to an established functional model includes:

the component creation module being specifically used for determining unique identifiers of mandatory parameters of components in the functional model, and determining an input end and output end of the new component according to the connection relationship of the components in the functional mode, so as to create the new component.

[0022] According to the methods and the graphic machine learning algorithm platforms described in this application, by releasing or building a functional model as new component, when a user needs to use a certain function repeatedly, the new component can be used directly without the need of establishing the functional model repeatedly, thereby facilitating use by the user.

Brief Description of the Drawings

[0023] In order to illustrate the embodiments of this application or the technical solutions in the prior art more clearly, the accompanying drawings used in descriptions of the embodiments or the prior art will be briefly described below. It is apparent that the accompanying drawings in the following description are merely some embodiments of this application, and for those skilled in the art, other accompanying drawings can be further obtained according to the accompanying drawings without creative efforts.

FIG. 1 is a schematic diagram of a model built by a user and having a function of analyzing user churn data;

FIG. 2 is a flowchart of a component release method disclosed in an embodiment of this application;

FIG. 3 is a schematic diagram of a graphic machine learning algorithm platform receiving an instruction to release a functional model as a new component disclosed in an embodiment of this application;

FIG. 4 is a schematic diagram of comparison between a configuration process and running process of a super component disclosed in an embodiment of this application;

FIG. 5 is a schematic diagram of a visual interface of a basic component disclosed in an embodiment of this application;

FIG. 6 is a schematic diagram of a configuration interface of a mandatory parameter configuration control disclosed in an embodiment of this application;

FIG. 7 is an exemplary flowchart of a component release method disclosed in an embodiment of this application;

FIG. 8 is a schematic diagram of using a super component disclosed in an embodiment of this application; and

FIG. 9 is a schematic structural diagram of a graphic machine learning algorithm platform disclosed in an embodiment of this application.

Detailed Description

[0024] The component release or building method provided by this application can be applied to a graphic machine learning algorithm platform, and aims to release or build a functional model built by original components of the graphic machine learning algorithm platform as a new component. For the sake of distinction, in the embodiments of this application, the original components of the graphic machine learning algorithm platform are referred to as basic components, and the new component that is released or built by the basic components is referred to as a super component. A basic component can be a component implementing a single algorithm, and can also be a component that is composed of multiple components each implementing a single algorithm.

[0025] The technical solutions in the embodiments of this application will be described clearly and completely in the following with reference to the accompanying drawings in the embodiments of this application. It is apparent that the described embodiments are only some of rather than all the embodiments of his application. Based on the embodiments of this application, all other embodiments obtained by those skilled in the art without creative efforts fall within the protection scope of this application.

[0026] FIG. 2 shows a component release method disclosed in an embodiment of this application, including the following steps:

S201, a graphic machine learning algorithm platform obtains, based on a user's operation instruction, a functional model to be built as a super component.

[0027] For the specific implementation of S201, reference can be made to the prior art; further details will not be given here.

[0028] S202, the graphic machine learning algorithm platform receives an instruction to release the functional model as a new component.

[0029] For example, FIG. 3 shows a process that has been established by a user in a graphic machine learning algorithm platform, in which the selected part is a functional model to be built as a super component. The user can right click on the functional model and select "Merge" in a pop-up menu, then the graphic machine learning algorithm platform determines that an instruction to release the functional model of the selected part as a new component is being received.

[0030] Further, as shown in FIG. 3, the graphic machine learning algorithm platform can also receive a name entered by the user for the super component. For example, after the user selects "Merge", the graphic machine learning algorithm platform pops up a dialog box and receives the name "Logistic Regression & Random Forest Evaluation" entered by the user in the dialog box.

[0031] S203, the graphic machine learning algorithm platform determines an input end and output end of the super component according to the connection relationship of components in the functional model.

[0032] Specifically, the connection relationship is a connection relationship indicated by arrows in the functional model, and the graphic machine learning algorithm platform uses a connection end of the functional model to an upstream component as the input end of the super component, and a connection end of the functional model to a downstream component as the output end of the super component.

[0033] Continuing with the above example, in FIG. 3, the connection end of the functional model to the upstream component is a port pointed to by an arrow of component "missing value filling-1", and the graphic machine learning algorithm platform uses the port as the input end of the super component. The connection ends of the functional model to the downstream components are ports of the connecting arrows of component "binary classification evaluation-1" and component "binary classification evaluation-2", respectively, and the graphic machine learning algorithm platform uses the two ports as the output ends of the super component.

[0034] It should be noted that, when the functional model has multiple ports connected to upstream components, the multiple ports connected to the upstream components are all used as input ends of the super component. When the functional model has multiple ports connected to downstream components, the multiple ports connected to the downstream components are all used as output ends of the super component.

[0035] S204, the graphic machine learning algorithm platform determines unique identifiers of mandatory parameters of the components in the functional model.

[0036] The unique identifiers are used for the new component to identify values of the mandatory parameters during running.

[0037] Specifically, after receiving an instruction to select a component in the functional model, the graphic machine learning algorithm platform displays a visual interface of the component, and receives a unique identifier of a mandatory parameter of the component through the visual interface. For example, as shown in the configuration process in FIG. 4, after receiving an instruction of the user double-clicking component "random forest" in the functional model, the graphic machine learning algorithm platform pops up a visual interface of the component "random forest", and the user can enter a unique identifier of a mandatory parameter of the component

"random forest" on the visual interface.

[0038] Further, as shown in FIG. 5, a visual interface of the basic component includes a configuration interface of a mandatory parameter configuration control and a configuration interface of an optional parameter configuration control (a configuration interface of an optional parameter configuration control is not shown in FIG. 4). The mandatory parameter configuration control is used for receiving a configuration instruction for a mandatory parameter during the running of the super component. The optional parameter configuration control is used for receiving a configuration instruction for an optional parameter during the running of the super component. As shown in FIG. 4, during the running of the super component, the user configures the mandatory parameters through the mandatory parameter configuration control, for example, entering values of the mandatory parameters. The configuration interface of the mandatory parameter configuration control in FIG. 4 is used for configuring the mandatory parameter configuration control. However, in existing graphic machine learning algorithm platforms, parameter configuration controls are all automatically set by a system and cannot be configured by the user.

[0039] As shown in FIG. 6, the configuration interface of the mandatory parameter configuration control includes at least a unique identifier configuration item. The unique identifier configuration item is used for receiving an identifier set by the user for the mandatory parameter. The user can input, through the identifier configuration item, the identifier set for the mandatory parameter, and the graphic machine learning algorithm platform uses data (including received or internally transmitted), identified by the super component as having the identifier, as the value of the mandatory parameter. In other words, as long as data with the identifier is identified during the running of the super component, the graphic machine learning algorithm platform uses the data as the value of the mandatory parameter. The data is used as the value of the mandatory parameter no matter which basic component in the super component identifies this data. In addition to the unique identifier configuration item, the configuration interface of the mandatory parameter configuration control may further include, but is not limited to, a control type configuration item, a control name configuration item, and a control prompt (including a prompt and a long prompt) text configuration item.

[0040] For example, FIG. 6 shows configuration items of a mandatory parameter "training feature column", including:

Control type: in FIG. 6, the user selects the control type to be "multi-field selection control (all fields are inherited downstream)" by drop-down option selection.

Unique identifier: in FIG. 6, the user enters "$FEATURE" as the unique identifier of the "training feature column" parameter.

Control name: in FIG. 6, the user enters "training feature column" as the name of the control.

Prompt text: in FIG. 6, the user enters "mandatory" as the prompt text for the control.

Long prompt text: in FIG. 6, the long prompt text is empty.

[0041] The configuration interface of the optional parameter configuration control includes the name of the optional parameter and a default value set by the graphic machine learning algorithm platform for the parameter. For example, "concurrent computation amount" in FIG. 5 is the name of an optional parameter, and the default value of the parameter is 100. The user can accept the default value and can also modify the default value in a parameter bar.

[0042] In S205, test data is input to the super component after completion of configuration, and the same test data is input to the functional model corresponding to the super component (i.e., the functional model that builds the super component). If the output result of the super component is the same as the output result of the functional model, S206 is performed; otherwise, at least one of S203 and S204 is performed.

[0043] S206, the super component is released.

[0044] In FIG. 2, the order of S202~S204 can be interchanged, and S205 is an optional step.

[0045] The process shown in FIG. 2 is exemplified in the following.

[0046] As shown in FIG. 7, a user drags basic components onto a canvas on a graphic machine learning algorithm platform and uses arrows to form the basic components into a process. The user selects a part from the process, and the user can also right click, select "Merge" in a pop-up menu, merge the selected components to form a modeling process subset, and enter the name "Logistic Regression & Random Forest Evaluation".

[0047] The graphic machine learning algorithm platform uses the port of starting basic component "missing value filling-1" of the modeling process subset, connecting to an upstream component, as the input end of the super component "Logistic Regression & Random Forest Evaluation", and uses the ports of end basic components "binary classification evaluation-1" and " binary classification evaluation-2" of the modeling process subset, connecting to downstream components, as output ends of the super component "Logistic Regression & Random Forest Evaluation".

[0048] The user clicks on basic component "random forest" in the modeling process subset, and the graphic machine learning algorithm platform pops up the visual interface shown in FIG. 5 in response to the user's click command.

[0049] The user completes configuration of the parameter configuration controls on the visual interface.

[0050] The graphic machine learning algorithm platform receives parameters input by the user for the super component of which the configuration has been complet-

ed, runs the super component, and obtains output data of the super component.

[0051] The graphic machine learning algorithm platform receives parameters input by the user for the modeling process subset, runs the modeling process subset, and obtains output data of the modeling process subset.

[0052] If the output data of the super component is the same as the output data of the modeling process subset, the graphic machine learning algorithm platform releases the super component.

[0053] At this point, the graphic machine learning algorithm platform has released a new super component. If users require the function of the modeling process subset, they can use the super component directly without the need of building the modeling process subset again.

[0054] The super component is used in the same way as a basic component. FIG. 8 shows a process of using the super component: the user drags the super component "Logistic Regression & Random Forest Evaluation" onto the canvas in the graphic machine learning algorithm platform and builds a process with other basic components and/or super components.

[0055] If the user clicks the "Logistic Regression & Random Forest Evaluation" super component, as shown in FIG. 4, the graphic machine learning algorithm platform pops up a parameter configuration control, such as the "training feature column configuration control." The user selects a field in the "training feature column configuration control" to enter data as a training feature column. After the user configures the data of each parameter, during the running of the super component, the data is input from the input end and transmitted. The data includes values of mandatory parameters of each component in the super component, and each component identifies, from these pieces of data, which data it requires, wherein the basis of identification is the unique identifiers set for the mandatory parameters during release of the component.

[0056] In addition, during the running of the super component, the graphic machine learning algorithm platform establishes a temporary Mysql table according to the directions of the arrows in the super component, for recording the input component and output component of each basic component, so as to transmit to each basic component information for its own input component and output component. The content of the temporary Mysql table includes four elements of the component: input, output, field settings, and parameter settings. When the component pointed to by the arrow is run, the four elements will be extracted from the Mysql table. After the super component finishes running, the graphic machine learning algorithm platform clears the Mysql table.

[0057] As can be seen from the above description, in the component release process shown in FIG. 2, a unique identifier is set for the mandatory parameter of the basic component by configuring the parameter configuration control of the basic component in the functional model, so that the mandatory parameter has the character of a "global parameter". That is, during the running of the super component, a basic component in the super component can identify which data is a value of a mandatory parameter needed by itself. Therefore, the super component released in FIG. 2 can be used repeatedly, which facilitates use by the user.

[0058] A graphic machine learning platform-based component creation method is further disclosed in the embodiments of this application, including the following steps:

After receiving a new component creation instruction, a graphic machine learning platform creates a new component according to an established functional model. A mandatory parameter of each component in the new component has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running.

[0059] In this embodiment, the specific manner of creating a new component according to an established functional model is: determining unique identifiers of mandatory parameters of components in the functional model, and determining an input and output end of the new component according to the connection relationship of the components in the functional model, so as to create the new component. For the specific implementation process of each step, reference can be made to FIG. 2.

[0060] After the new component is created, the graphic machine learning platform can release the new component according to a user's instruction.

[0061] It can be seen that in this embodiment, the graphic machine learning platform has the function of creating a new component.

[0062] FIG. 9 shows a graphic machine learning algorithm platform disclosed in an embodiment of this application, including: an input and output determination module, an identifier determination module, and a release module.

[0063] The input and output determination module is used for determining, after receiving an instruction to release a functional model as a new component, an input end and output end of the new component according to the connection relationship of components in the functional model. The identifier determination module is used for determining unique identifiers of mandatory parameters of the components in the functional model, wherein the unique identifiers are used for the new component to identify values of the mandatory parameters during running. The release module is used for releasing the functional model as the new component.

[0064] For the specific function implementation process of each module, reference can be made to FIG. 2; further details will not be given here.

[0065] The graphic machine learning algorithm platform described in this embodiment has the function of releasing a functional model as a new component, and thus can facilitate use by the user.

[0066] A graphic machine learning algorithm platform is further disclosed in the embodiments of this applica-

tion, including a component creation module used for creating, after receiving a new component creation instruction, a new component according to an established functional model, wherein a mandatory parameter of each component in the new component has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running. The specific implementation manner of creating a new component according to an established functional model is: determining unique identifiers of mandatory parameters of the components in the functional model, and determining an input end and output end of the new component according to the connection relationship of the components in the functional model, so as to create the new component.

[0067] It can be seen that the graphic machine learning algorithm platform described in this embodiment has the function of creating a new component.

[0068] If implemented in the form of software functional units and sold or used as separate products, the functions described in the methods of the embodiments of this application may be stored in a computing device-readable storage medium. Based on such understanding, the portion of the embodiments of this application that contributes to the prior art or the technical solution portion may be embodied in the form of a software product. The software product is stored in a storage medium and includes several instructions for enabling a computing device (which may be a personal computer, a server, a mobile computing device, or a network device, etc.) to perform all or some of the steps of the methods described in various embodiments of this application. The foregoing storage medium includes: a USB flash disk, a mobile hard disk, a Read-Only Memory (ROM), a Random Access Memory (RAM), a magnetic disk, an optical disc, or other various media that can store program codes.

[0069] The various embodiments in the specification are described in a progressive manner, each embodiment focuses on differences from other embodiments, and identical or similar parts of the various embodiments may be obtained with reference to each other.

[0070] The above description of the disclosed embodiments enables those skilled in the art to implement or use this application. Various modifications to these embodiments would be obvious to those skilled in the art, and the general principles defined herein may be implemented in other embodiments without departing from the spirit or scope of this application. Therefore, this application is not limited to the embodiments shown herein, but is to be accorded with the broadest scope consistent with the principles and novel characteristics disclosed herein.

Claims

1. A component release method, comprising:

after receiving an instruction to release a functional model as a new component, determining an input end and output end of the new component according to the connection relationship of components in the functional model;
determining unique identifiers of mandatory parameters of the components in the functional model, wherein the unique identifiers are used for the new component to identify values of the mandatory parameters during running; and
releasing the functional model as the new component.

2. The method according to claim 1, wherein determining unique identifiers of mandatory parameters of the components in the functional model comprises:

after receiving an instruction to select a component in the functional model, displaying a visual interface of the component; and
receiving the unique identifier of the mandatory parameter of the component through the visual interface.

3. The method according to claim 2, wherein the visual interface comprises:
a configuration interface of a mandatory parameter configuration control of the component, wherein the mandatory parameter configuration control is used for receiving a configuration instruction for the mandatory parameter during the running of the new component.

4. The method according to claim 3, wherein the visual interface further comprises:
a configuration interface of an optional parameter configuration control, wherein the optional parameter configuration control is used for receiving a configuration instruction for the optional parameter during the running of the new component.

5. The method according to any of claims 1 to 3, wherein releasing the functional model as the new component comprises:

inputting test data to the new component and running the new component;
inputting the test data to the functional model and running the functional model; and
if data output by the new component after running is the same as data output by the functional model after running, releasing the functional model as the new component.

6. A graphic machine learning platform-based component creation method, comprising:
after receiving a new component creation instruction, a graphic machine learning platform creating a

new component according to an established functional model, wherein a mandatory parameter of each component in the new component has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running.

7. The method according to claim 6, wherein creating a new component according to an established functional model comprises:
determining unique identifiers of mandatory parameters of components in the functional model, and determining an input end and output end of the new component according to the connection relationship of the components in the functional model, so as to create the new component.

8. A graphic machine learning algorithm platform, comprising:

an input and output determination module for determining, after receiving an instruction to release a functional model as a new component, an input end and output end of the new component according to the connection relationship of components in the functional model;
an identifier determination module for determining unique identifiers of mandatory parameters of the components in the functional model, wherein the unique identifiers are used for the new component to identify values of the mandatory parameters during running; and
a release module for releasing the functional model as the new component.

9. The graphic machine learning algorithm platform according to claim 8, wherein the identifier determination module being used for determining unique identifiers of mandatory parameters of the components in the functional model comprises:
the identifier determination module being specifically used for displaying, after receiving an instruction to select a component in the functional model, a visual interface of the component, and receiving the unique identifier of the mandatory parameter of the component through the visual interface.

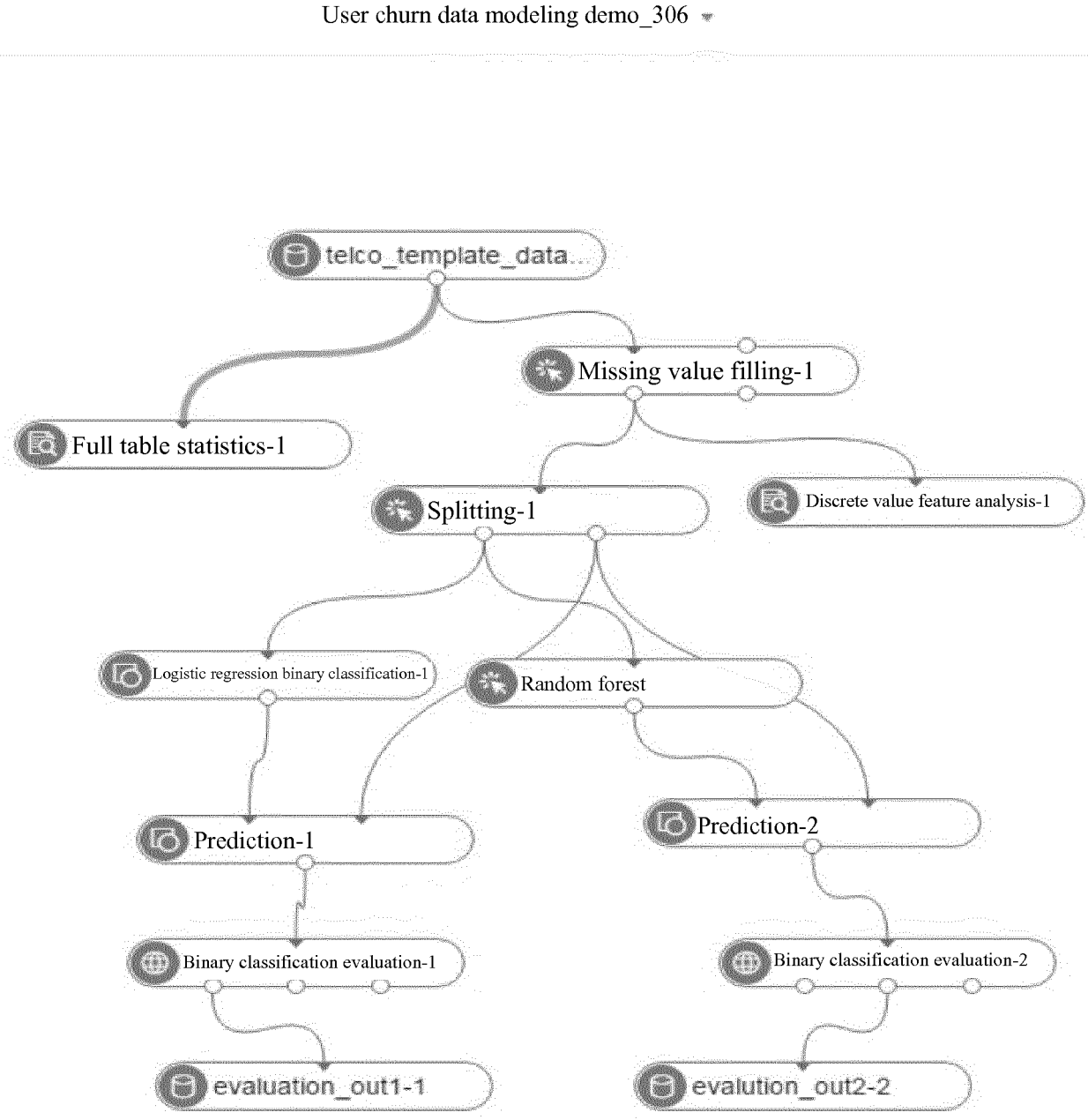
10. The graphic machine learning algorithm platform according to claim 9, wherein the identifier determination module being used for displaying a visual interface of the component comprises:
the identifier determination module being specifically used for displaying a configuration interface of a mandatory parameter configuration control of the component, wherein the mandatory parameter configuration control is used for receiving a configuration instruction for the mandatory parameter during the running of the new component.

11. The graphic machine learning algorithm platform according to claim 10, wherein the visual interface further comprises:
a configuration interface of an optional parameter configuration control, wherein the optional parameter configuration control is used for receiving a configuration instruction for the optional parameter during the running of the new component.

12. The graphic machine learning algorithm platform according to any of claims 8 to 11, wherein the release module being used for releasing the functional model as the new component comprises:
the release module being specifically used for inputting test data to the new component and running the new component, inputting the test data to the functional model and running the functional model, and if data output by the new component after running is the same as data output by the functional model after running, then releasing the functional model as the new component.

13. A graphic machine learning algorithm platform, comprising:
a component creation module configured for creating, after receiving a new component creation instruction, a new component according to an established functional model, wherein a mandatory parameter of each component in the new components has a unique identifier, and the unique identifier is used for the new component to identify the value of the mandatory parameter during running.

14. The graphic machine learning algorithm platform according to claim 13, wherein the component creation module is specifically used for determining unique identifiers of mandatory parameters of components in the functional model, and determining an input end and output end of the new component according to the connection relationship of the components in the functional model, so as to create the new component.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Logistic regression binary classification-1
Random forest
Prediction-1
Prediction-2
Binary classification evaluation-1
Binary classification evaluation-2
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evalution_out2-2

FIG. 1

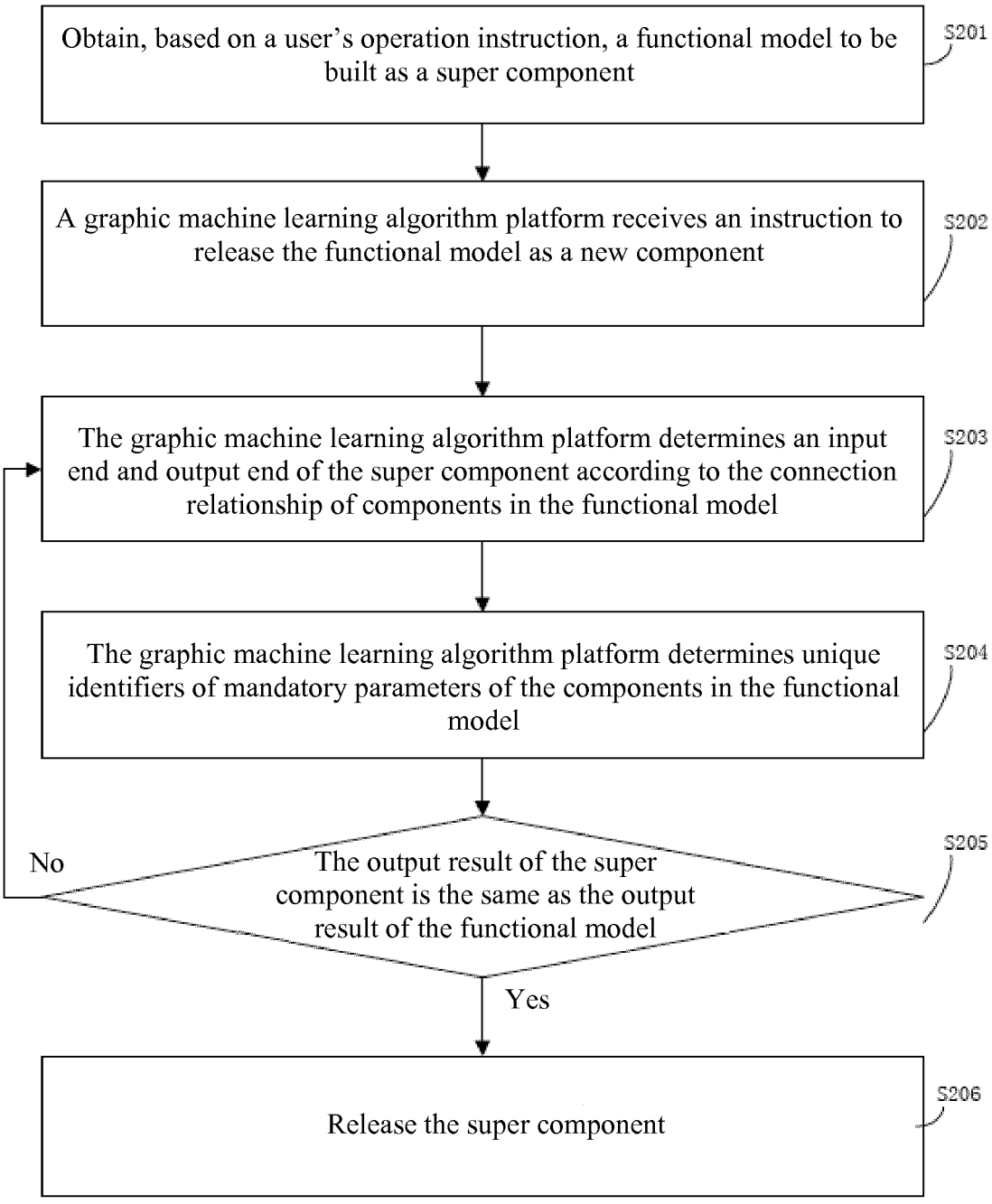
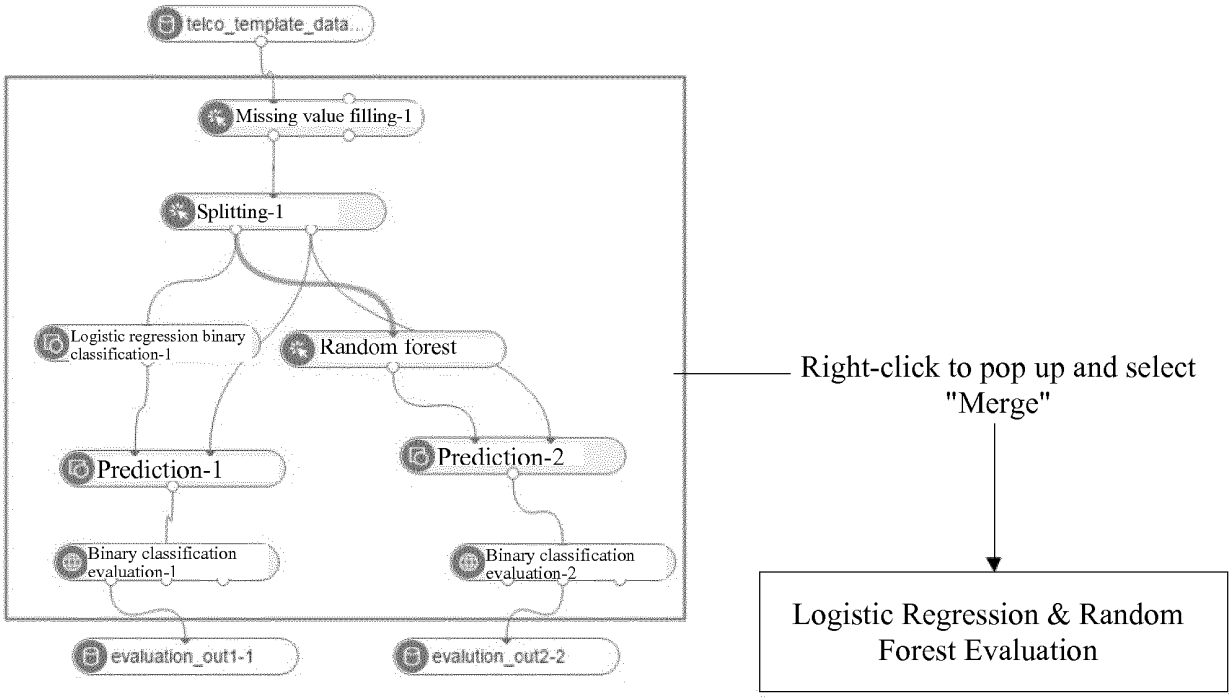

Obtain, based on a user's operation instruction, a functional model to be built as a super component
S201
A graphic machine learning algorithm platform receives an instruction to release the functional model as a new component
S202
The graphic machine learning algorithm platform determines an input end and output end of the super component according to the connection relationship of components in the functional model
S203
The graphic machine learning algorithm platform determines unique identifiers of mandatory parameters of the components in the functional model
S204
The output result of the super component is the same as the output result of the functional model
S205
No
Yes
Release the super component
S206

FIG. 2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Splitting-1
Logistic regression binary classification-1
Random forest
Prediction-1
Prediction-2
Binary classification evaluation-1
Binary classification evaluation-2
evaluation_out1-1
evalution_out2-2
Right-click to pop up and select "Merge"
Logistic Regression & Random Forest Evaluation

FIG. 3

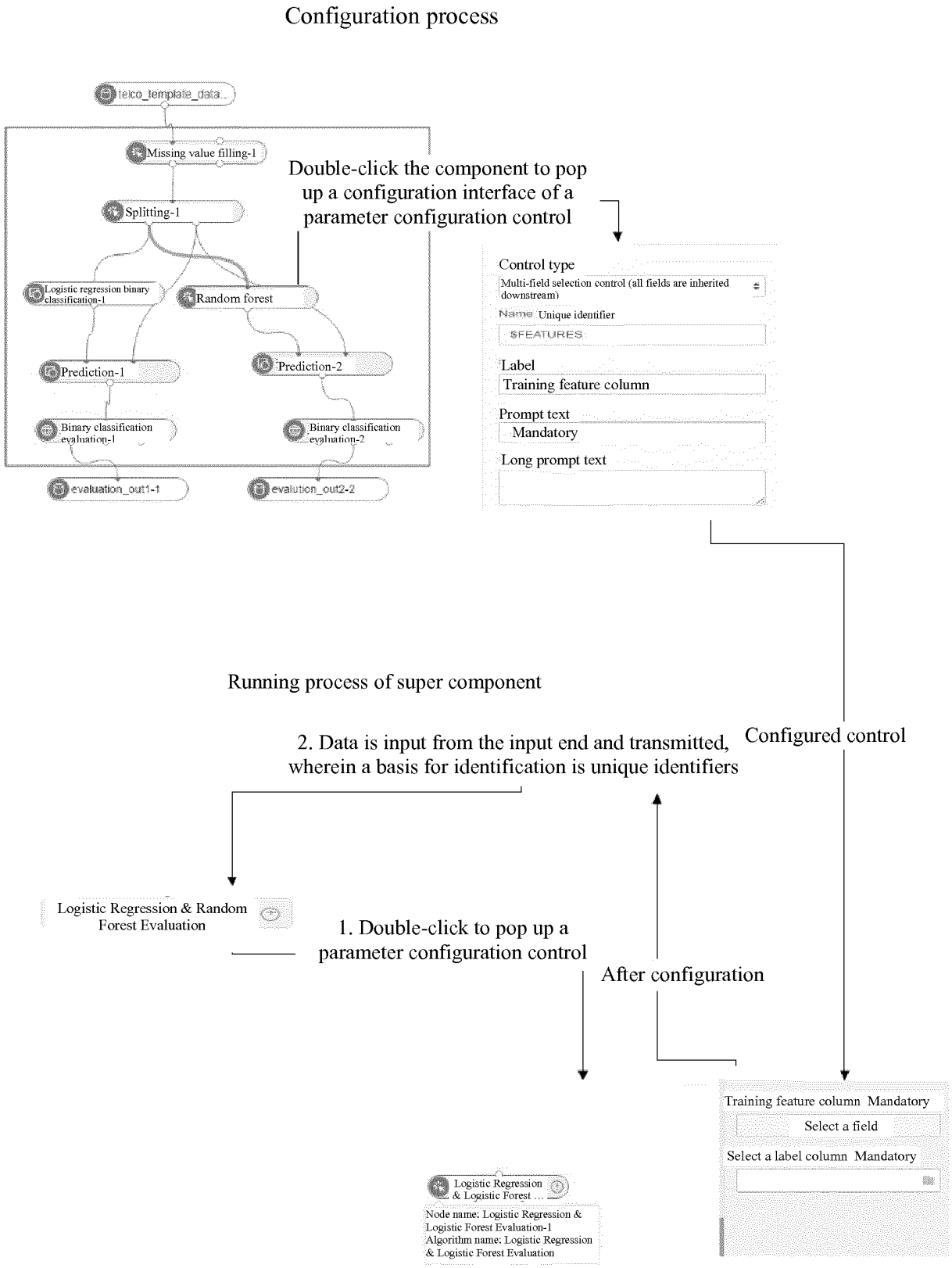
Configuration process
telco_template_data...
Missing value filling-1
Splitting-1
Logistic regression binary classification-1
Random forest
Prediction-1
Prediction-2
Binary classification evaluation-1
Binary classification evaluation-2
evaluation_out1-1
evalution_out2-2
Double-click the component to pop up a configuration interface of a parameter configuration control
Control type
Multi-field selection control (all fields are inherited downstream)
Name Unique identifier
$FEATURES
Label
Training feature column
Prompt text
Mandatory
Long prompt text
Configured control
Running process of super component
2. Data is input from the input end and transmitted, wherein a basis for identification is unique identifiers
Logistic Regression & Random Forest Evaluation
1. Double-click to pop up a parameter configuration control
After configuration
Training feature column Mandatory
Select a field
Select a label column Mandatory
Logistic Regression & Logistic Forest ...
Node name: Logistic Regression & Logistic Forest Evaluation-1
Algorithm name: Logistic Regression & Logistic Forest Evaluation

FIG. 4

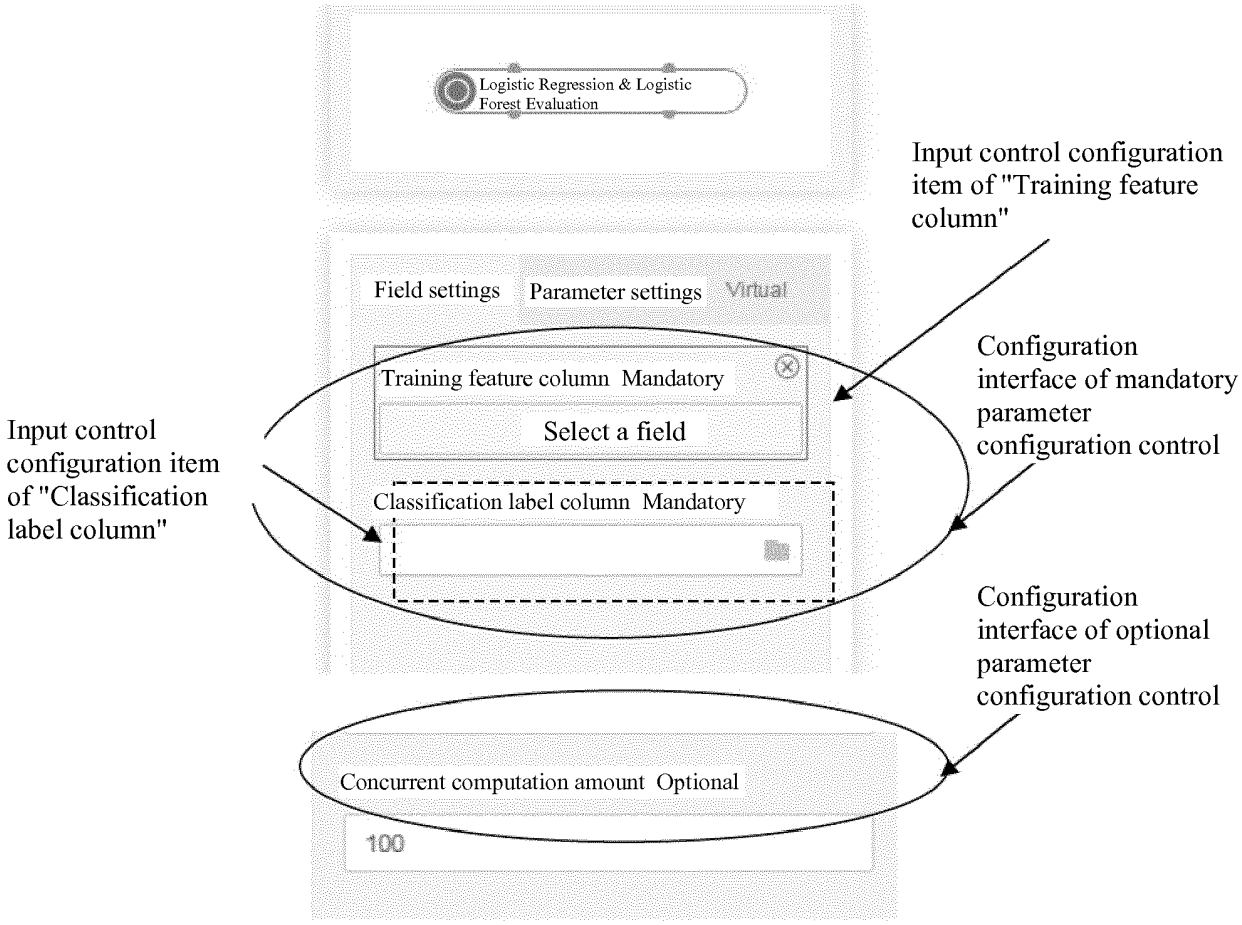
Logistic Regression & Logistic Forest Evaluation
Field settings
Parameter settings
Virtual
Training feature column Mandatory
Select a field
Classification label column Mandatory
Concurrent computation amount Optional
100
Input control configuration item of "Training feature column"
Configuration interface of mandatory parameter configuration control
Input control configuration item of "Classification label column"
Configuration interface of optional parameter configuration control

FIG. 5

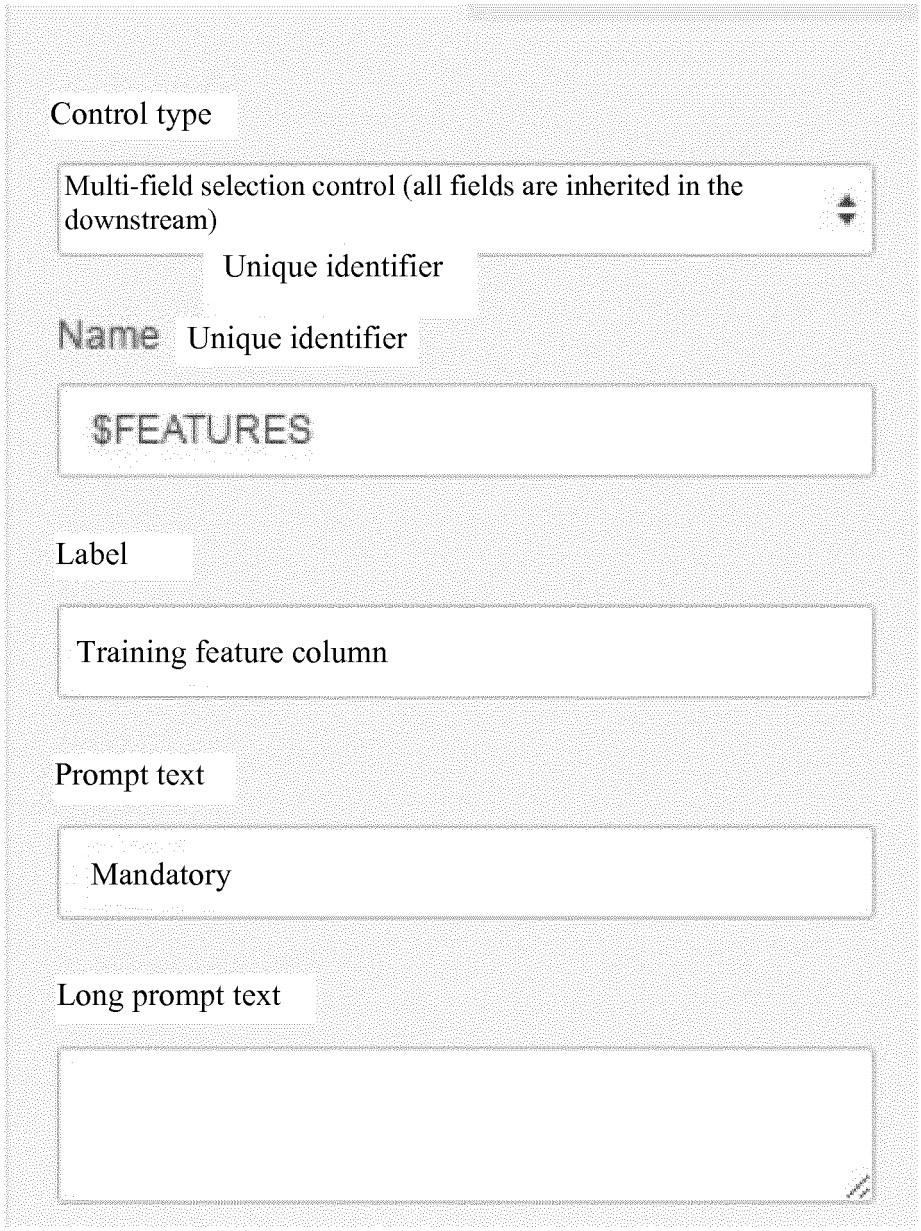
Control type
Multi-field selection control (all fields are inherited in the downstream)
Unique identifier
Name
Unique identifier
$FEATURES
Label
Training feature column
Prompt text
Mandatory
Long prompt text

FIG. 6

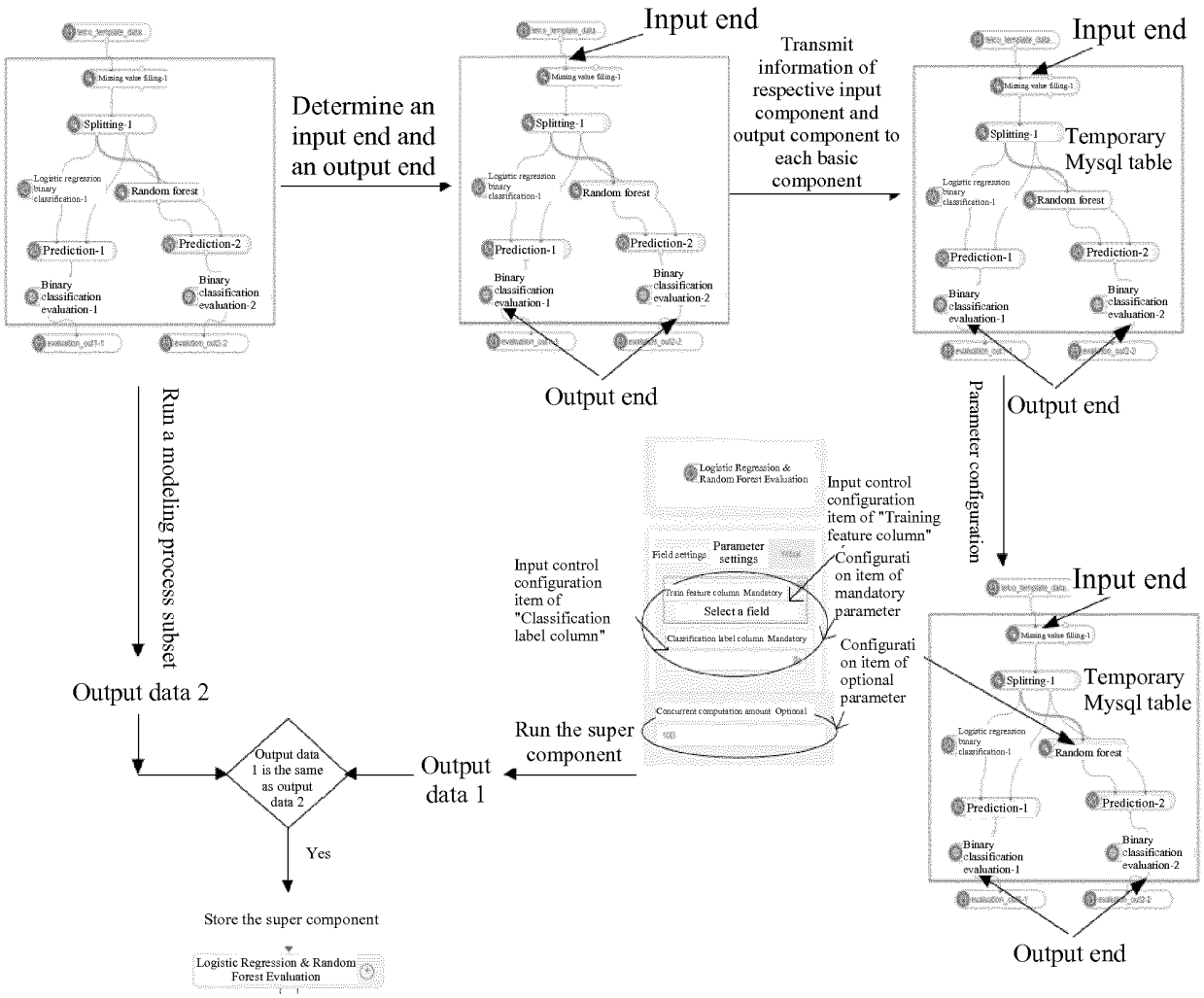
Mining value filling-1
Splitting-1
Logistic regression binary classification-1
Random forest
Prediction-1
Prediction-2
Binary classification evaluation-1
Binary classification evaluation-2
Determine an input end and an output end
Input end
Output end
Transmit information of respective input component and output component to each basic component
Temporary Mysql table
Parameter configuration
Run a modeling process subset
Output data 2
Output data 1 is the same as output data 2
Yes
Output data 1
Run the super component
Store the super component
Logistic Regression & Random Forest Evaluation
Logistic Regression & Random Forest Evaluation
Field settings
Parameter settings
Train feature column Mandatory
Select a field
Classification label column Mandatory
Concurrent computation amount Optional
Input control configuration item of "Classification label column"
Input control configuration item of "Training feature column"
Configuration item of mandatory parameter
Configuration item of optional parameter

FIG. 7

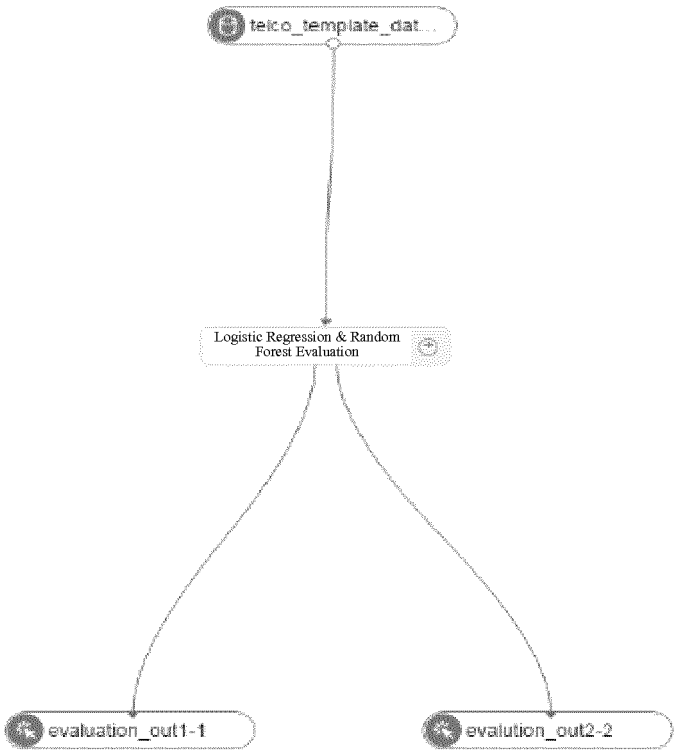
telco_template_dat...
Logistic Regression & Random Forest Evaluation
evaluation_out1-1
evalution_out2-2

FIG. 8

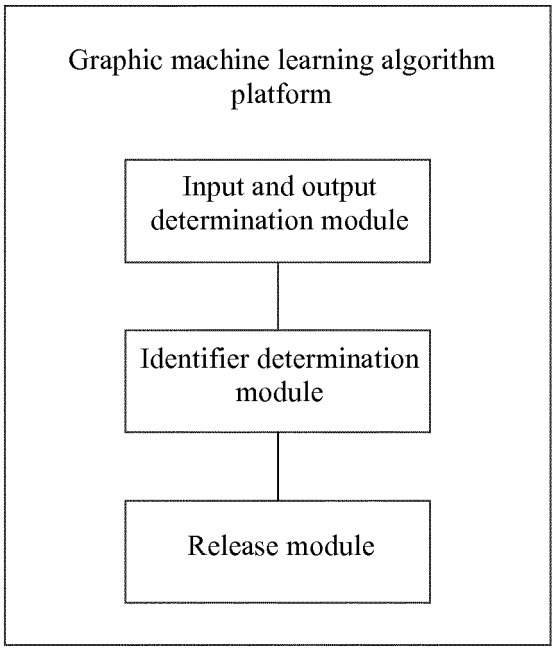
Graphic machine learning algorithm platform
Input and output determination module
Identifier determination module
Release module

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/118433

A. CLASSIFICATION OF SUBJECT MATTER

G06F 9/44 (2018.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT; CNABS; CNKI; VEN; USTXT; EPTXT: 图形化, 可视化, 机器学习, 模型, 组件, 标识, 参数, 连接关系, 发布, 输入, 输出, visual, graphical, module, modeling, machine learning, identifier, ID, parameter, connect+, publish+, release+, input, output

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 105677446 A (THE 10TH RESEARCH INSTITUTE OF CHINA ELETRONICS TECHNOLOGY GROUP CORPORATION), 15 June 2016 (15.06.2016), description, paragraphs 5-47	1-14
Y	CN 104216691 A (HUAWEI TECHNOLOGIES CO., LTD.), 17 December 2014 (17.12.2014), description, paragraphs 6-17	1-14
A	CN 103984818 A (DALIAN UNIVERSITY OF TECHNOLOGY), 13 August 2014 (13.08.2014), entire document	1-14
A	CN 105988786 A (BEIJING SIMULATION CENTER), 05 October 2016 (05.10.2016), entire document	1-14
A	US 7966269 B2 (BAUER, J.D. et al.), 21 June 2011 (21.06.2011), entire document	1-14

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 February 2018	19 March 2018
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer YANG, Niu Telephone No. (86-10) 28950388

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/118433

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 105677446 A	15 June 2016	None	
CN 104216691 A	17 December 2014	CN 104216691 B	17 November 2017
		US 2016085520 A1	24 March 2016
		WO 2014190821 A1	04 December 2014
		US 9720658 B2	01 August 2017
CN 103984818 A	13 August 2014	CN 103984818 B	18 January 2017
CN 105988786 A	05 October 2016	None	
US 7966269 B2	21 June 2011	US 2009299924 A1	03 December 2009
		US 2007136218 A1	14 June 2007
		WO 2007048137 A2	26 April 2007
		WO 2007048137 A3	04 December 2008

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201710011143 **[0001]**